USARIEM: Research Roles of AMSC Officers

Research Roles of AMSC Officers Assigned to the U.S. Army Research Institute of Environmental Medicine (USARIEM), Natick, Massachusetts

The U.S. Army Research Institute of Environmental Medicine (USARIEM) is a laboratory of the U.S. Army Medical Research and Materiel Command, Fort Detrick, MD. The Institute's mission is to conduct basic and applied research to determine how exposure to extreme heat, severe cold, high terrestrial altitude, occupational tasks, physical training, deployment operations, and nutritional factors affect the health and performance of military personnel. For more information, visit the USARIEM homepage at www.usariem.army.mil. Army Medical Specialist Corps officers are assigned to two of the four research divisions at USARIEM.

Military Performance Division (65A, 65B, 65D)
Currently, three Army Physical Therapists and one Physician Assistant are assigned to USARIEM's Military Performance Division (MPD), which has the mission to conduct research to enhance the performance (physical, cognitive, behavioral and psychomotor) of military occupational tasks, and to prevent performance decrements due to physical overload, nutritional deprivation, environmental and operational stresses and musculoskeletal injuries. The MPD's research programs are Injury Epidemiology, Biomechanics, Performance Physiology, and Cognitive Performance. The Institute has one authorization for an Occupational Therapist that is currently unfilled.

65A:
Occupational Therapists at USARIEM have been involved in a variety of research areas related to their clinical background and educational qualifications. These include ergonomic/occupational task performance, exercise and work fatigue, stress diagnostic methods, and cognitive/behavioral studies. Prior to his retirement last summer, LTC Max Ito worked closely with research psychologists in MPD's Cognitive Performance research program. This program's objective is to identify and/or validate diagnostic measures or tools of operational mental stress and to develop strategies to sustain mental performance by investigating cognitive and behavioral decrements due to environmental and operational stress.

65B:
Physical therapists at USARIEM have led and contributed to research efforts in all four research programs within MPD, and have filled various administrative roles. All are currently working on a new 5-year Scientific and Technology Objective (STO) entitled *Physical Training Interventions to Enhance Military Task Performance & Reduce Musculoskeletal Injuries*. Included in this effort are several research projects designed to test new training programs designed to improve performance while minimizing injuries. These include methods for short-

term train-up for rapid deployment; alternative training to high volume running; resistance training for improved occupational performance; resistance training to reduce injuries; and identification of biomarkers that reflect the positive and negative responses to training. If successful, these programs will have far reaching benefits for individual health, army readiness, and for the clinician who treats musculoskeletal injuries. Physical therapists at USARIEM are currently collaborating with the Center for Health Promotion and Preventive Medicine (CHPPM) in writing a new TB MED on prevention of musculoskeletal injuries associated with physical training in the Army. The most recent research effort where 65Bs are the lead agents is the study entitled "Shoulder-fired Weapons with High Recoil Energy: Quantifying Injury and Shooting Performance". This particular study is a collaborative effort between USARIEM, the Army Research Laboratory (ARL), and Walter Reed Army Medical Center (WRAMC) and is in support of CHPPM's efforts to establish a health hazard assessment of recoil from shoulder-fired weapons. The next research effort that will involve 65Bs is entitled "Physical Training and Bone Remodeling: Singular vs. Combined Effects of Resistance and Aerobic Exercise". This effort is a collaborative study with the University of Connecticut and is in the final stages of approval. Another area of responsibility located at USARIEM, which is under the care of an army physical therapist is the $27 million congressionally sponsored Bone Health and Military Medical Readiness program. MAJ Rachel Evans serves as the director of this program and has been responsible for establishing a new Bone Health Laboratory with state-of-the-art imaging equipment at USARIEM. For more information on the exciting work and research opportunities at USARIEM contact COL Steve Allison, MAJ Rachel Evans or MAJ Kenneth Blankenship, 508-233-4800.

65D:

Physician Assistant contributions to the research activities at USARIEM focus on injury prevention in Soldiers. The Physician Assistant performs injury epidemiologic analysis on training in conventional and unconventional units to assess the risk of injury and evaluate interventions. Additionally, the Physician Assistant is the current Chair of the Human Use Review Committee. The Physician Assistant research conducted in the past year has primarily focused on injuries in general in SOCOM units, particularly foot injuries, and injury incidence in a Forward Support Battalion. He is currently developing research projects that will help us better understand readiness, deployability, and injury issues for reservists and National Guard soldiers. For more information contact LTC Joe Creedon, 508-233-4286.

Military Nutrition Division (65C)

The Military Nutrition Division's (MND) mission is to conduct research to define the nutritional requirements and standards for operational rations, develop nutritional strategies to sustain and enhance warfighter performance in all environments, identify effective weight management strategies, and to evaluate ration and feeding systems. There are seven military and civilian doctoral investigators in the MND, two of whom are Army Registered Dietitians. We are fortunate to also have a Public Health Service dietitian, with a doctoral degree, join our staff, even if briefly, to provide research support in the weight management program. One MS trained Army Dietitian is also assigned to the MND. MND investigators respond to and represent The

Surgeon General, the DoD Executive Agent for Nutrition, in areas of nutrition research. In order to accomplish its mission, MND researchers partner with other research facilities to include Pennington Biomedical Research Center, Tufts University, the Massachusetts Institute of Technology (MIT), Boston University (BU) and Harvard University. The three research programs (task areas) that support the bioenergetics and metabolism core capability of the MND are:

- Nutritionally Optimized Future Warrior Assault Rations. The goal of this task area is to elucidate metabolic mechanisms that can be exploited by novel nutritional strategies that enhance health and performance in terms of fueling function and performance and sustaining the biological matrix. Included is research to optimize warfighter mental status by nutritional intervention, which examines mechanisms involved in neurobiological control of cognitive, sensory, and motor responses to maintain homeostasis.

- Weight Management Strategies. The goal of this task area is to identify strategies to reduce the prevalence of overweight/overfat personnel (noncompliance with AR 600-9, The Army Weight Control Program) and weight related attrition. Monitoring compliance with AR 600-9 and identifying risk factors for unsuccessful weight control and subsequent attrition and behavior modification are the major focus areas of this task area.

- Ration Sustainment Testing. It is under this program that MND establishes nutritional standards for meals served to military personnel, evaluates and approves current and proposed operational rations, and conducts assessments and surveys of the nutritional status and food consumption patterns in military personnel.

65C

Dietitians have a rich history of conducting important research at USARIEM. They provide research and technical expertise in each MND research program and serve on the USARIEM Human Use Review Committee and other key committees.

LTC Ann Grediagin's research is focused on protein requirements at altitude and during periods of energy restriction. A recently completed study at Pikes Peak suggests that, compared to sea level, altitude exposure accelerates protein loss for a given energy deficit. An ongoing study "The effect of fitness level, caloric intake, and protein intake of short-term nitrogen balance during a 1000-calorie increase in daily energy expenditure" specifically targets protein utilization during a scenario that simulates deployment. The results of these studies will be used to evaluate the current Military Dietary Reference Intake and Nutritional Standard for Operational Rations for protein and to make recommendations regarding the optimal protein content of operational rations and/or nutritional supplements.

LTC Gaston Bathalon has focused his research on weight management strategies. A recent focus has been to study the impact of changes to AR 600-9, The Army Weight Control Program, on compliance/noncompliance rates. Much of this work is being done at a recently established USARIEM satellite research laboratory within WAMC at Ft. Bragg. This work supports

increasing female screening table weights and changing to new DoD body fat equations and has been briefed to the highest levels of Army leadership. These changes will be made in the newly published AR 600-9 in the coming fiscal year. LTC Bathalon is now conducting a survey of Soldiers placed on the Army Weight Control Program to identify behaviors and characteristics that make them more at risk for noncompliance with AR 600-9. We are currently in the early stages of protocol development to evaluate and compare each service's weight management programs and to evaluate the behaviors (healthy and unhealthy) and characteristics of Soldiers that comply with AR 600-9. Taken together, these research efforts will provide needed focus areas for the web-based weight management site being developed by weight management experts at the Pennington Biomedical Research Center. Future plans include the evaluation of new interventions programs for efficacy in military settings.

CPT Susan Jordan has recently joined the MND and is making important contributions to two protocols. She is a collaborator on the protocol, "Physical Training and Bone Remodeling: Singular vs. Combined Effects of Resistance and Aerobic Exercise." This protocol will measure changes in dietary intakes, attitudes and behaviors of female subjects engaged in different physical training regimens. CPT Jordan is also a co-investigator for the MRE Nutrient Analysis Project. The purpose of this project is threefold: to update the MRE nutrient database, to elucidate micronutrient discrepant values, and to evaluate/validate label claims provided by the three MRE manufacturers. CPT Jordan also submitted a chapter for publication on nutritional myths and misinformation for a new book on weight management targeting military health care providers working with overweight recruits.